

# MCSE Guide to Microsoft® Windows® 2000 Server

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# Preface

Career opportunities abound for well-prepared server administrators, which is one of the fastest growing fields in information technology. This book is designed to provide you with a thorough grounding in Windows 2000 Server, the powerful server operating system of the new millennium. If you are new to Windows 2000 Server or server administration, this is your ticket to an exciting future. If you are preparing for certification as a Microsoft Certified Professional (MCP) or as a Microsoft Certified Systems Engineer (MCSE), this book provides the knowledge you need as preparation for certification exam # 70-215, *Installing, Configuring, and Administering Microsoft Windows 2000 Server*. Others who have prior experience with Windows NT Server or Windows 2000 Server will find that the book adds depth and breadth to that experience.

The book is filled with all kinds of features to help you prepare for the exam and to help you develop as a confident server administrator. You learn, step-by-step, how to accomplish the Windows 2000 Server tasks, from the easiest to the most complex. Your learning is supplemented by realistic examples, insightful tips, thought-provoking review questions, hands-on projects, and case projects that simulate those you'll experience in real life.

Windows 2000 Server ushers in a new and mature server network operating system well positioned to meet the needs of the smallest to the largest organizations. It provides the cornerstone on which to build a business, an Internet Web site, or access information-rich data sources. Windows NT Server has been one of the most successful server network operating systems ever offered and Windows 2000 Server builds on that success with new and extensive networking features.

When you complete this book, you will have a solid foundation on which to build as a sophisticated and experienced Windows 2000 Server administrator. This book provides you with knowledge that you can apply right away and other knowledge you can apply in the future. As part of your preparations, the book gives you plenty of direct experience and a wide range of planning, installation, configuration, management, and troubleshooting scenarios.

Each chapter in the book is filled with hands-on projects that cover many aspects of installing and managing Windows 2000 Server. The projects are designed to make what you learn come alive through actually performing the tasks. Besides the hands-on projects, each chapter gives you experience through realistic case projects that put you in the shoes of a Windows 2000 Server consultant who works in all kinds of situations fulfilling the needs of clients. Also, every chapter includes review questions to drive home your knowledge while

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preparing you for the Microsoft certification exam. All of these features are offered to reinforce your learning so you feel confident in the knowledge you have gained from each chapter and so you develop as a resourceful server administrator.

**Chapter 1**, “Networking with Microsoft Windows 2000 Server,” helps you plan the general networking model to use for Windows 2000 Server. This chapter explains the Windows 2000 Server capabilities as an operating system, presents new features in Windows 2000 Server, and helps you plan which file system to implement when you set up a server. In **Chapter 2**, “Planning for Server Hardware,” you learn the hardware requirements for Windows 2000 Server and how to develop specifications for a server that include choosing the right processor, the right amount of memory, and the right amount of disk storage. You also learn how to plan for optimum disk performance and fault tolerance. **Chapter 3**, “Planning Network Protocols and Compatibility,” provides background in networking and network protocols. It helps you to understand the many protocols used by Windows 2000 Server and how to select the best protocol for your organization’s needs. You also learn how to install and configure protocols for different applications and types of networks.

**Chapter 4**, “Planning the Active Directory and Security,” gives you a solid introduction to the Active Directory, which is a new feature to Windows 2000 Server. Knowledge of the Active Directory enables you to take command of your organization’s server and manage network resources that include workstations, printers, and shared data. Part of your learning includes hands-on experience with installing the Active Directory. Chapter 4 also gives you an opportunity to learn how to secure a server and network resources.

In **Chapter 5**, “Server Installation,” you learn how to plan a server installation so that it goes smoothly from step 1. Next, you learn the step-by-step process of installing Windows 2000 Server using different methods such as installing the operating system via CD-ROM and installing it through the network. In **Chapter 6**, “Server Configuration,” you discover how to configure the server for specialized monitors, keyboards, network communications, and many other needs. You also learn to use the Device Manager to analyze hardware properties and troubleshoot problems. **Chapter 7**, “Configuring Server Storage, Backup, and Performance Options,” continues with configuration issues for server disk storage, backups, and performance enhancements. It also shows you how to protect against lost data and equipment power failures. In **Chapter 8**, “Managing Accounts and Client Connectivity,” you learn how to configure client accounts, account security policies, and how to set up client operating systems to access a Windows 2000 Server network. As part of the client operating system setup, you learn how to implement Remote Installation Services. **Chapter 9**, “Managing Groups, Folders, Files, and Object Security,” gives you grounding in how to manage the server and security through groups and how to securely set up shared folders and files for access by clients.

In **Chapter 10**, “Managing Dfs, Disk Quotas, and Software Installation,” you learn more about sharing folder and file resources by setting up the Distributed File System (Dfs). You also learn how to establish disk quotas and how to install server software. **Chapter 11**, “Installing and Managing Printers,” shows how Windows 2000 Server takes much of the headache out of managing network printing. In this chapter you learn how to set up and manage all types of printers. In **Chapter 12**, “Remote Access and Virtual Private Networks,” you learn about turning a Windows 2000 Server into a tool that can be

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accessed from home by telecommuters or by users who travel from city to city. You also learn how to set up a Windows 2000 Server as a secure virtual private network (VPN), which capitalizes on a popular trend in networking. **Chapter 13**, “Managing Internet and Network Interoperability,” shows you how to make a Windows 2000 server function as a full-featured Web server. You also learn how to set up critical network communication features such as Domain Name Service and terminal services.

The last three chapters in the book show you how to monitor and tune a server and the network to which it is connected, and you learn to troubleshoot problems. In **Chapter 14**, “Server Monitoring and Optimization,” you learn how to use Windows 2000 Server tools to track server performance. You also learn techniques for improving server performance in all kinds of ways. **Chapter 15**, “Network Monitoring and Tuning,” shows you how to use Windows 2000 Server monitoring tools to measure network performance and determine how to improve that performance. Both Chapters 14 and 15 give you solid grounding in tuning server and network elements such as memory, file system cache, disk storage, and network communications. Finally, in **Chapter 16**, “Troubleshooting,” you learn how to troubleshoot a full range of problems that can emerge including software, hardware, and network problems.

## FEATURES

To aid you in fully understanding Windows 2000 concepts, there are many features in this book designed to match the ways in which you learn.

- ◆ **Chapter Objectives.** Each chapter in this book begins with a detailed list of the concepts to be mastered within that chapter. This list provides you with a quick reference to the contents of that chapter, as well as a useful study aid.
  - ◆ **Illustrations and Tables.** Numerous illustrations of server screens and components aid you in the visualization of common setup steps, theories, and concepts. In addition, many tables provide details and comparisons of both practical and theoretical information and can be used for a quick review of topics.
  - ◆ **Chapter Summaries.** Each chapter’s text is followed by a summary of the concepts it has introduced. These summaries provide a helpful way to recap and revisit the ideas covered in each chapter.
  - ◆ **Review Questions.** The end-of-chapter assessments begin with a set of review questions that reinforce the ideas introduced in each chapter. These questions not only ensure that you have mastered the concepts, but are written to help you become familiar with the types of questions used in Microsoft certification examinations.
  - ◆ **Hands-on Projects.** Although it is important to understand the theory behind server and networking technology, nothing can improve upon real-world experience. To this end, along with theoretical explanations, each chapter provides numerous hands-on projects aimed at providing you with real-world implementation experience.
  - ◆ **Case Project.** Located at the end of each chapter is a multipart case project. In this extensive case example, as a consultant at the fictitious Aspen Consulting, you implement the skills and knowledge gained in the chapter through real-world server setup and administration scenarios.
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- ◆ **Team Case Projects.** Each chapter concludes with two optional team case projects that enable you to work in a small group of students to solve a real-world problem or to extensively research a topic. These projects give you experience working as a team member, which is a common format used by many businesses and corporations.

## TEXT AND GRAPHIC CONVENTIONS

Wherever appropriate, additional information and exercises have been added to this book to help you better understand what is being discussed in the chapter. Icons throughout the text alert you to additional materials. The icons used in this textbook are as follows.



Tips are included from the author's experience that provide extra information about how to attack a problem, how to set up Windows 2000 Server for a particular need, or what to do to in certain real-world situations.



The Note icon is used to present additional helpful material related to the subject being described.



The cautions are included to help you anticipate potential mistakes or problems so you can prevent them from happening.



Each Hands-on Project in this book is preceded by the Hands-On icon and a description of the exercise that follows.



Case Project icons mark the case project. These are more involved, scenario-based assignments. In this extensive case example, you are asked to implement independently what you have learned.



Optional Case Project icons indicate special projects that students can tackle as a group and that often require extra research and group decision making, which simulates the team environment stressed in many organizations.

## INSTRUCTOR'S MATERIALS

The following supplemental materials are available when this book is used in a classroom setting. All of the supplements available with this book are provided to the instructor on a single CD-ROM.

**Electronic Instructor's Manual.** The Instructor's Manual that accompanies this textbook includes:

- ◆ Additional instructional material to assist in class preparation, including suggestions for lecture topics, suggested lab activities, tips on setting up a lab for the hands-on assignments, and alternative lab setup ideas in situations where lab resources are limited.
- ◆ Solutions to all end-of-chapter materials, including the Review Questions, Hands-on Projects, Case Projects and Optional Team Case Projects assignments.

**Course Test Manager 1.3.** Accompanying this book is a powerful assessment tool known as the Course Test Manager. Designed by Course Technology, this cutting-edge Windows-based testing software helps instructors design and administer tests and pre-tests. In addition to being able to generate tests that can be printed and administered, this full-featured program also has an online testing component that allows students to take tests at the computer and have their exams automatically graded.

**PowerPoint presentations.** This book comes with Microsoft PowerPoint slides for each chapter. These are included as a teaching aid for classroom presentation, to make available to students on the network for chapter review, or to be printed for classroom distribution. Instructors, please feel at liberty to add your own slides for additional topics you introduce to the class.

## STUDENT'S MATERIALS

**Student case assignment files.** The instructor's CD-ROM comes with student case assignment files for each chapter. These files contain the end-of-chapter Case and Optional Team Case assignments in electronic format so that students can enter their answers and submit them through e-mail, to a shared network folder, or print them for submission to the instructor.

**Electronic glossary.** An electronic glossary with hyperlinks is provided on the instructor's CD-ROM for distribution to each student, such as through a Web page or a shared network folder.

**Windows 2000 Server command summary.** A summary of the Windows 2000 Server Command Prompt window commands is provided for distribution to students in electronic format.

## ACKNOWLEDGMENTS

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## DEDICATION

To my parents Helen and Edward Palmer

## READ THIS BEFORE YOU BEGIN

### To the Student

This book offers a beginning from which to understand the power and resources of Windows 2000 Server. Every chapter is designed to present you with easy-to-understand information about Windows 2000 Server to help you plan and implement this operating system in different networking contexts. Each chapter of the book ends with review questions, hands-on projects, case assignments, and team case assignments that are written to be as realistic as the work you will soon be performing. Your instructor can provide you with answers to the review questions and additional information about the hands-on projects. When you complete the case and optional team case assignments, you can submit them electronically or in written form. The student project files provided by your instructor consist of Microsoft Word files for each end of chapter case and optional team case project. You can enter your answers in the space provided within the file and submit them to your instructor by disk, by printing out your answers, through the network, or through e-mail.

**To the Instructor (Refer to the Instructor's Resource Kit that accompanies this text for more details.)**

***Setting up the classroom or lab file server.*** To complete the projects and assignments in the book, the students will need access to a computer running Windows 2000 Server. To maximize the learning experience, it is recommended that you have one or more servers that can be dedicated for classroom use. Each server need not be an expensive model, but should be on Microsoft's Hardware Compatibility List. There is an advantage in having several servers for student projects so that the students have more flexibility in their practice. Every server should be equipped with Microsoft Windows 2000 Server and have licenses as appropriate for your laboratory or practice setup. The Instructor's Resource Kit contains many suggestions about how to set up a lab, including how to equip and manage a lab in which there are limited resources. It also contains alternative projects and assignments for students.

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The Hands-on Projects in the text require that students have Administrator privileges or accounts with Administrator privileges.

**Internet assignments.** A few projects require Internet access for information searches. These projects are not mandatory; however, the projects will help train the student in using this resource as a prospective server administrator.

**Accepting assignments electronically.** The case assignment files included on the instructor's CD-ROM are for distribution to your students and are in Microsoft Word format. This enables you to accept assignments electronically, if appropriate to your classroom setting. For more details, please refer to the Instructor's Manual.

**System requirements.** The recommended software and hardware configurations are as follows:

### **Workstation Clients**

- ◆ Windows 3.11 or higher (Windows 95, Windows 98, Windows NT Workstation, or Windows 2000 Professional are preferred)
- ◆ 386 or higher processor with 4 MB of RAM (486 or higher with 8+ MB of RAM preferred)
- ◆ VGA monitor
- ◆ Mouse or pointing device
- ◆ Network interface card connected to the classroom, lab, or school network
- ◆ Hard disk drive
- ◆ At least one high density 3.5-inch floppy disk drive
- ◆ Internet access and a browser (recommended but not required for selected research assignments)

### **Windows 2000 Server Hardware**

- ◆ Listed in Microsoft's Hardware Compatibility List
  - ◆ Pentium 166 MHz or faster
  - ◆ 64 MB of RAM or more
  - ◆ VGA or better resolution monitor
  - ◆ Mouse or pointing device
  - ◆ High density 3.5-inch floppy disk drive
  - ◆ 12X or faster CD-ROM drive
  - ◆ One or more hard disks with at least 1 GB or more of disk storage
  - ◆ Network interface card for network communications
  - ◆ Tape system (recommended but not required)
  - ◆ Modem (recommended but not required)
  - ◆ Printer (to practice setting up a network printer)
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